INSURANCE AS AN ADAPTATION STRATEGY FOR EXTREME WEATHER EVENTS IN DEVELOPING COUNTRIES AND ECONOMIES IN TRANSITION

NEW OPPORTUNITIES FOR PUBLIC-PRIVATE PARTNERSHIPS

Prepared for the Agency for International Development
Bureau for Economic Growth, Agriculture and Trade
Office of Environment and Science Policy
Climate Change Team

by

Evan Mills
University of California
Lawrence Berkeley National Laboratory
MS 90-4000, Berkeley, California 94720 USA
emills@lbl.gov • http://eetd.lbl.gov/insurance

June 30, 2004

LBNL Report No. 52220

Electronic copies of this report may be found at:
http://eetd.lbl.gov/emills/PUBS/Insurance_Emerging_Markets.html

> The loss of forests, fresh water and biodiversity, inadequate and inefficient use of energy, and the explosive growth in the world's urban centers undermine long-term economic growth and threaten ecological systems. They also endanger human health, and increase developing countries' vulnerability to natural disasters and conflict.... Long-term economic growth depends upon managing a country's natural resource base, using energy to increase human productivity, helping cities to provide services and markets, and having predictable seasonal and long-term climatic conditions.
>
> – U.S. Agency for International Development (2002)

PREFACE & ACKNOWLEDGMENTS

This report was commissioned by the U.S. Agency for International Development, with the joint aims of characterizing the insurance and reinsurance markets in developing countries and economies in transition, exploring the implications for changing patterns of extreme weather events (be they the result of natural variability or anthropogenic climate change), and, finally, identifying possible public-private initiatives to further engage the insurance sector in the process of sustainable development.

The research represents a fusion of literature from several fields: development, disaster relief, climate change, energy systems, and insurance and risk management. Sources include the insurance trade press, grey literature and reports, peer-reviewed journals, as well as primary data (especially from Swiss Re and Munich Re – the world's two largest reinsurance companies – widely regarded as the definitive sources of global insurance market data).

In this report we use the term "emerging [insurance] markets" to encompass both developing countries and economies in transition. Emerging markets are those with low insurance penetration, and are typically characterized by rapid growth in the use of insurance, and high vulnerability to natural disasters in comparison with industrialized countries. This is the parlance of the insurance industry, and is thus useful language for communicating with the insurance community. Moreover, the terminology encourages consideration of economic implications and demographic, rather than strictly geographical, patterns of vulnerability

Special thanks to Ko Barrett and Carrie Stokes (USAID Climate Change Team), Harry Proctor and Sezine Tokar (USAID Office of Foreign Disaster Assistance), Paul Epstein (Harvard Medical School, Center for Health and the Global Environment), Angelika Wirz (Munich Re), Jean Lucey (Insurance Library Association), Devesh Nirmul (Padco), and Stephen Wiel, Mirka della Cava, and Laura Van Wie McGrory (Lawrence Berkeley National Laboratory). Nan Wishner provided able editorial assistance. This publication was made possible through support provided by the Bureau for Economic Growth, Agriculture and Trade, Office of Environment and Science Policy, Climate Change Team, U.S. Agency International Development, under the terms of Award No. ENV-P-00-99-00003-00. The opinions expressed herein are those of the author and do not necessarily reflect the views of the U.S. Agency for International Development.

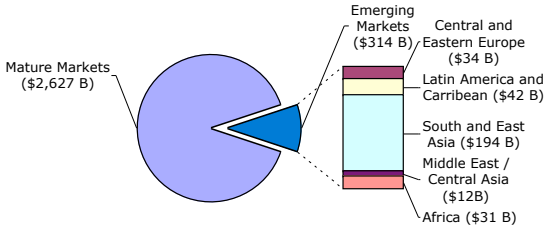
Contents

SYNOPSIS

The insurance industry[1] can play a material role in decreasing the vulnerability of developing countries and economies in transition to weather-related natural disasters while simultaneously supporting both its own market-based objectives and the objectives of sustainable development. Although insurance is not a "silver bullet" for the problems posed by natural disasters in emerging markets, public-private partnerships can enhance insurance's ability to spread the risks and manage the costs of weather-related disasters as well as to increase the pool of people who have access to coverage. (For simplicity in this report, the phrase "emerging markets" is intended to encompass developing countries and economies in transition.) Promising strategies for emerging markets involve establishing innovative products and systems for delivering insurance and using technologies and practices that both reduce vulnerability to disaster-related insurance losses and support sustainable development (including reducing greenhouse gas emissions). These strategies can enhance sustainable development efforts and increase the insurability of risks, making insurance markets in emerging markets more viable.

Emerging markets are especially vulnerable to extreme weather events, which impede development by causing physical damage, compromising human and ecosystem health, diverting scarce resources to disaster relief and recovery, and deterring future investment and insurance availability by amplifying the risks faced by foreign interests. An average of 300 million people are affected or killed each year by weather-related disasters in emerging markets. Characteristics of emerging markets contributing to their particular vulnerability in contrast to developed nations include: greater frequency of poverty; weaker lifelines (transportation, communication, utilities, emergency response, and hospitals); poorer quality of construction and absence of or deficiencies in building codes and other regulations; and high dependence on resource-based industries (e.g., agriculture). Natural disasters such as drought often dislocate large groups of people, amplifying their vulnerability to future disasters. Development itself can compound these vulnerabilities by promoting population growth, urbanization, intensive coastal development, and concentrations of climate-sensitive physical and health-related hazards.

Eleven Percent of $2.9 Trillion/year Global Insurance Market is in Developing Countries and Economies in Transition: 2003

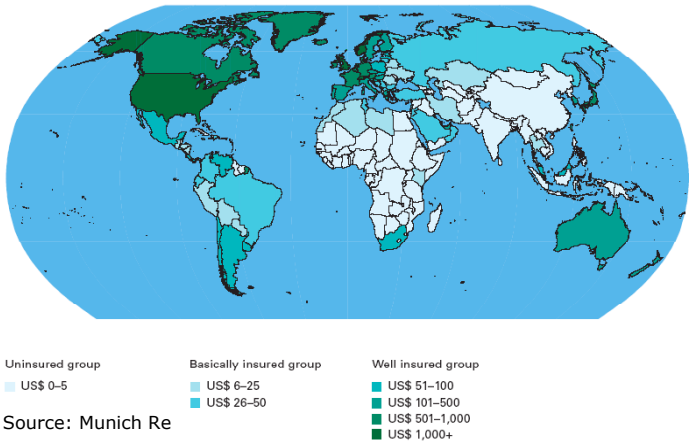


Source: Swiss Re, Economic Research & Consulting, Sigma No. 3/2004 [Swiss Re (2004)]. Includes property/casualty and life/health insurance.

With its pool of financial reserves, the global insurance market provides considerable adaptive capacity for weather-related damage to property, life, and health. The global insurance market—perhaps the world's largest industry—represented $2.9 trillion in premiums in 2003, or approximately eight percent of global gross domestic product (GDP). To put this in perspective, the insurance industry's revenues make it equivalent to the third largest country in the world in terms of GDP.

In 2003, total premiums in emerging markets represented $314 billion (up from $270 billion just a year earlier) or 11 percent of the global total, with growth rates often dramatically higher than those in the industrial world (twice as high, on average, between 1980 and 2000) and often exceeding GDP growth rates. Emerging markets are poised to represent half of world insurance premiums by the middle of this century.

The Use of Insurance varies Widely Around the World (non-life premiums/capita)



Source: Munich Re

[1] Unless otherwise noted, the terms "insurance" and "reinsurance" are used synonymously in this report.

Insurance premiums are rising in part because the economic costs of natural disasters are growing, as is the insured share (up from a negligible level in the 1950s to approximately 20 percent of the total today). Insurance market conditions vary regionally. Current insurance penetration (premiums per GDP) is lowest in Africa and Asia and highest in Latin America. Premiums as a percent of GDP are lowest in the Middle East/Central Asia and Latin America and highest in Africa. The smallest market by total premiums is the Middle East/Central Asia, and the largest is South and East Asia (excluding Japan).

The economic costs of weather-related events are high, totaling $1 trillion worldwide from 1980 through 2003. During this period, insurance covered four percent of total costs of weather-related disasters in emerging markets compared to 40 percent in high-income countries. While relatively small, insurance payments to people in emerging markets associated with these losses were three-times the magnitude of international aid. The potential for changes in weather patterns, including both average conditions and extreme events, would likely raise the demand for insurance whether the changes are a result natural variability or human-induced climate change. At the same time, increases in weather-related damage create uncertainties and challenge insurers' ability and willingness to assume or affordably price these new risks. Sustainable development can contribute to managing and maintaining the insurability of these risks and thereby reduce the need for individuals and governments to absorb the costs.

Because of the multi-national structure of the insurance and reinsurance markets, and other factors, the economic consequences of extreme weather events are becoming increasingly globalized. The growth of foreign insurers' premiums in emerging markets averaged more than 20 percent per year through the 1990s. During the late 1990s, the U.S. alone was collecting approximately $40 billion in premiums each year for policies placed in other countries. This globalization of the risks and consequences of natural disasters is a significant reason for the insurance industry to seek to reduce the risks of claims worldwide.

Cost-effectively mitigating the damage from (and thus the costs of) natural disasters would be a boon not only to the insurance industry and developed nations but to public health and sustainable development in emerging markets. One of many strategies is curtailing deforestation, which reduces risks of wildfire, malaria, mudslides, and flooding as well as reducing greenhouse gas emissions. Sustainable energy technologies can also mitigate risk; for example, distributed power systems coupled with efficient energy end-use technologies reduce business interruptions resulting from damage to the power grid.

In sum, involving the insurers of extreme weather events in the development and execution of strategies that contribute to public health and sustainable development would enhance disaster resilience, reduce the magnitude of losses, and thus help increase insurers' willingness to establish, maintain, and expand a constructive presence in emerging markets. We offer the following principles for establishing priorities:

- Focus on efforts that enhance the fundamental insurability of weather-related risks.
- Couple insurance efforts with core development activities.
- Foster efficient domestic government and private insurance risk sharing.
- Utilize public-private partnerships.
- Build domestic/local insurance and risk-management capacity.
- Discourage complacency in response to insurance availability or government aid.
- Respond to insurers' regional priorities.
- Address life and health insurance issues along with those related to property damage.
- Raise awareness within the insurance sector.
- Harness market-pull forces (e.g., foster aggregated demand for insurance products).
- Understand insurers' relationship to the security implications of climate change.

Using these principles, this report outlines a sampling of specific initiatives that could be undertaken to develop improved information and analysis, sustainable technologies to enhance resilience to disasters, and innovative insurance products and services. Specific criteria should be developed to help prioritize the opportunities. As insurers have many "fires to fight," and environmental issues such as natural or human-induced climate change must compete for attention among other strategic concerns, key target markets (economic, demographic, and geographic) should be identified, and proposed initiatives should clearly define their relevance to the insurers. It is incumbent on public entities seeking partnerships with insurers to establish and demonstrate the value of these partnerships. This study is a step toward that goal.

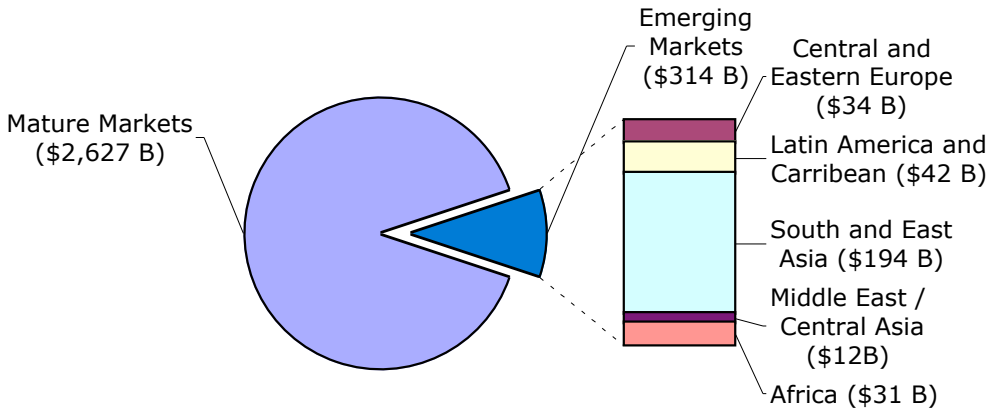
EXECUTIVE SUMMARY

The Insurance Industry[2] Can Play a Material Role in Decreasing the Vulnerability of Developing Countries and Economies in Transition to Weather-Related Natural Disasters while Supporting its Market Objectives and Sustainable Development.

Traditional responses to the impacts of extreme weather events, such as emergency relief, are critical but woefully inadequate. International aid today absorbs only one percent of total weather-related disaster costs and is consistently less than the amounts requested by impacted countries. With the rate of weather-related losses increasing dramatically, rising natural-disaster costs in aid-receiving countries, and growing demand for other forms of aid, relief aid is unlikely to absorb a greater share of the costs of natural disasters in the future. However, growing interest in an integrated notion of development and disaster relief (UNDP 2002) could leverage the funds that are currently directed toward development so that they also address disaster resilience and sustainable development.

Insurance is a promising vehicle for complementing international aid and improving the adaptive capacity of developing nations and economies in transition (referred to together as "emerging markets" in this report) to respond to natural disasters. Insurance activity in emerging markets is three-times that of international aid, in terms of insurance payouts versus aid funds expended, and availability and use of insurance is growing while international aid levels remain roughly level. Nonetheless, the penetration of insurance in emerging markets is low compared to that in industrialized countries. Insurance premiums in emerging markets as of the year 2003 totaled approximately $314 billion (up from $270 billion just a year earlier), or 11 percent of the global market (Figure ES-1).

Figure ES-1. Eleven Percent of $2.9 Trillion/year Global Insurance Market is in Developing Countries and Economies in Transition: 2003



Source: Swiss Re, Economic Research & Consulting, Sigma No. 3/2004 [Swiss Re (2004)].
Includes property/casualty and life/health insurance.

Although insurance is not a panacea for the problems posed by weather- and climate-related risks, it can help absorb costs that cannot be addressed by international aid or local governments or citizens. Almost all "lines" of insurance are vulnerable to climate risks, whether they be direct property losses from natural hazards or business interruptions from the disruption of electricity grids or environmental liability claims caused by water contaminated by flood-related runoff from farms. Limitations to insurance's effectiveness in addressing these costs include the short time frame of insurance contracts and the ease with which insurers can withdraw from or increase prices in markets perceived as overly risky. Moreover, the insurance industry itself is vulnerable to extreme weather events and climate change, and its capacity to absorb risk varies depending on recent losses and other market factors. Nonetheless, insurers have historically used risk-management and loss-prevention techniques to reduce business risks in particular market segments; these strategies can be applied in emerging markets and productively coupled with sustainable development strategies.

The success or failure of insurance in emerging markets depends to some extent on the political, fiscal, and regulatory environment in those markets.[3] That is, the ability of foreign insurers to enter a new market depends on local political and regulatory protections, and domestic insurers may also require enabling regulation. Examples of regulatory interventions include restrictions on pricing, the types of investments insurers can make, limitations placed by host countries on access to international markets, and allowable reserve accumulations (Auffret 2003). Effective insurance regulation must strike a balance between allowing insurers an attractive return on their business activities and ensuring their solvency (and ability to pay claims) in the event of major disasters. Other needs include regulatory policies that support fiscal transparency and responsibility, and measures that can garner the trust of the insurance-buying public.

Three key types of activities could support the coupling of insurance and sustainable development:

- Generating information, training, and analysis to help make emerging markets attractive (i.e., less risky) for insurers;
- Identifying and deploying sustainable technologies to help emerging markets adapt to and mitigate natural disasters; and
- Fostering innovative insurance products and financing mechanisms to increase this form of risk spreading.

A major challenge is in setting priorities and developing the public-private partnerships necessary for success.

[3] For example, the introduction of tax-deductible life insurance premiums boosted the premium growth rate in Mexico and in Brazil (Swiss Re 2003a). In contrast, financial crises can dampen insurance markets in various ways (Swiss Re 2003a).

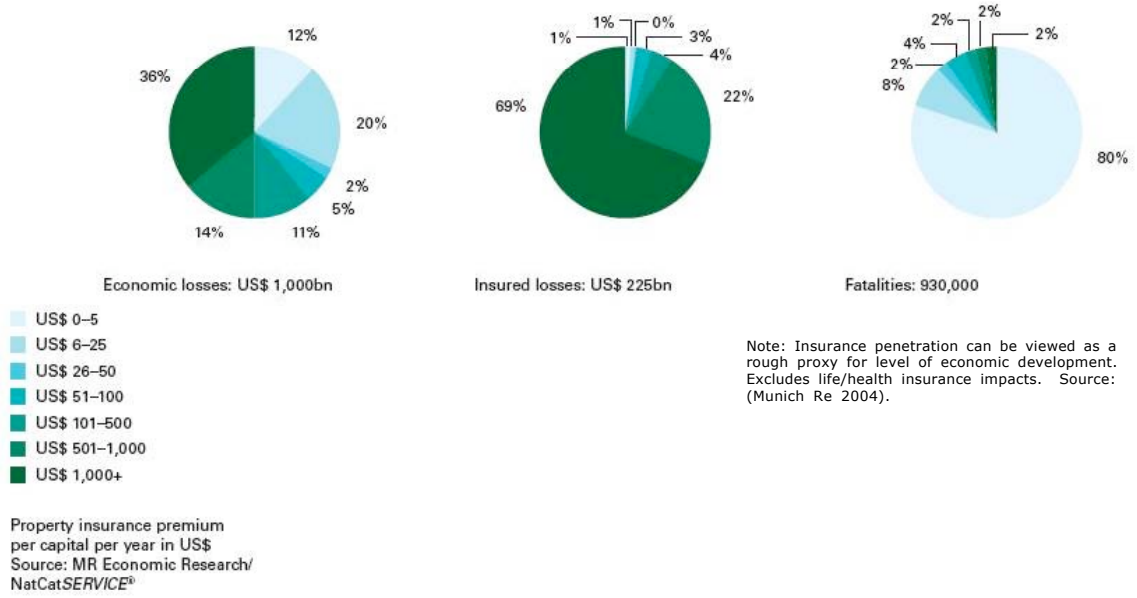
Emerging Markets are Particularly Vulnerable to Extreme Weather Events and are Constrained in their Ability to Adapt.

Extreme weather events and natural disasters can transform the physical, social, and economic landscapes of nations. They also create an impediment to development by causing physical damage, death, and disease; disrupting residents' livelihoods; diverting scarce resources from development to relief and recovery; and deterring future investment because they increase the risks that foreign interests face.

Development, especially if it excludes risk management, can compound vulnerability by, for example, increasing populations in urban, coastal, and other vulnerable regions (UNDP 2004).

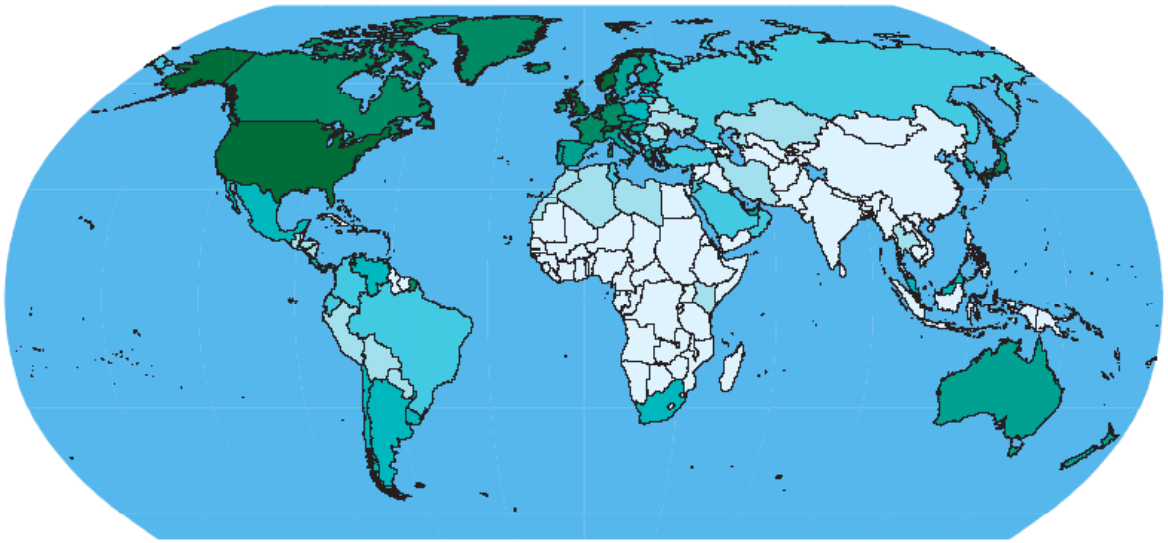
The economic costs of natural disasters fall disproportionately on the relatively wealthy, but the social costs – death and disease – fall largely on the poor. Wealthy countries experience more than 90 percent of the insured losses from natural catastrophes but only four percent of the deaths associated with these events (see Figure ES-2, which uses premiums per capita as a proxy for wealth).

Figure ES-2. Weather-Related Disasters - 1980-2003: The Economic Costs of Natural Catastrophes Fall Primarily on Wealthy Populations; the Loss of Life Primarily on the Poor



Although absolute costs are relatively low, economic impacts of natural disasters are greater in poorer nations; the costs of natural disasters between 1985 and 1999 equaled 13 percent of gross domestic product (GDP) in the poorest countries versus only two percent in the wealthiest countries (UNISDR 2003). The penetration of insurance varies considerably around the world, as does the type and scale of disasters (Figure ES-3).

Figure ES-3. The Use of Insurance varies Widely Around the World



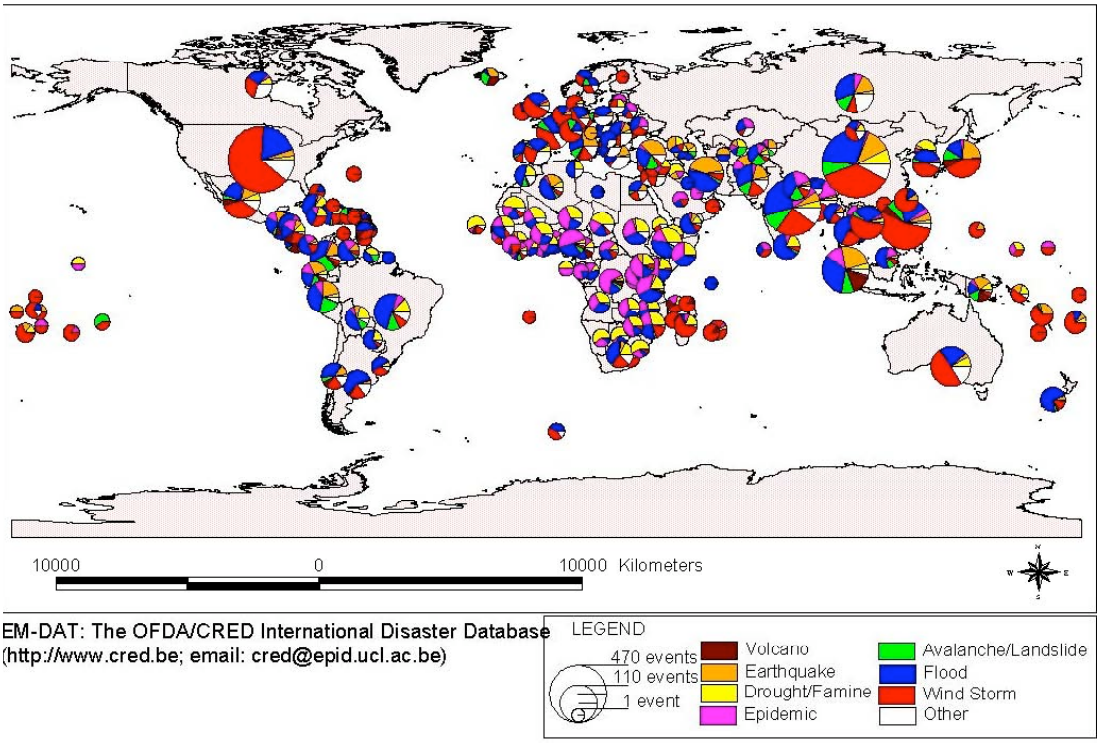
Uninsured group
- US$ 0–5

Basically insured group
- US$ 6–25
- US$ 26–50

Well insured group
- US$ 51–100
- US$ 101–500
- US$ 501–1,000
- US$ 1,000+

Property insurance premium (non-life including health) per capita per year in US$
Source: MR Economic Research/NatCat*SERVICE*®

The Type and Scale of Natural Disasters are Distributed Unevenly: 1975 to 2001



EM-DAT: The OFDA/CRED International Disaster Database
(http://www.cred.be; email: cred@epid.ucl.ac.be)

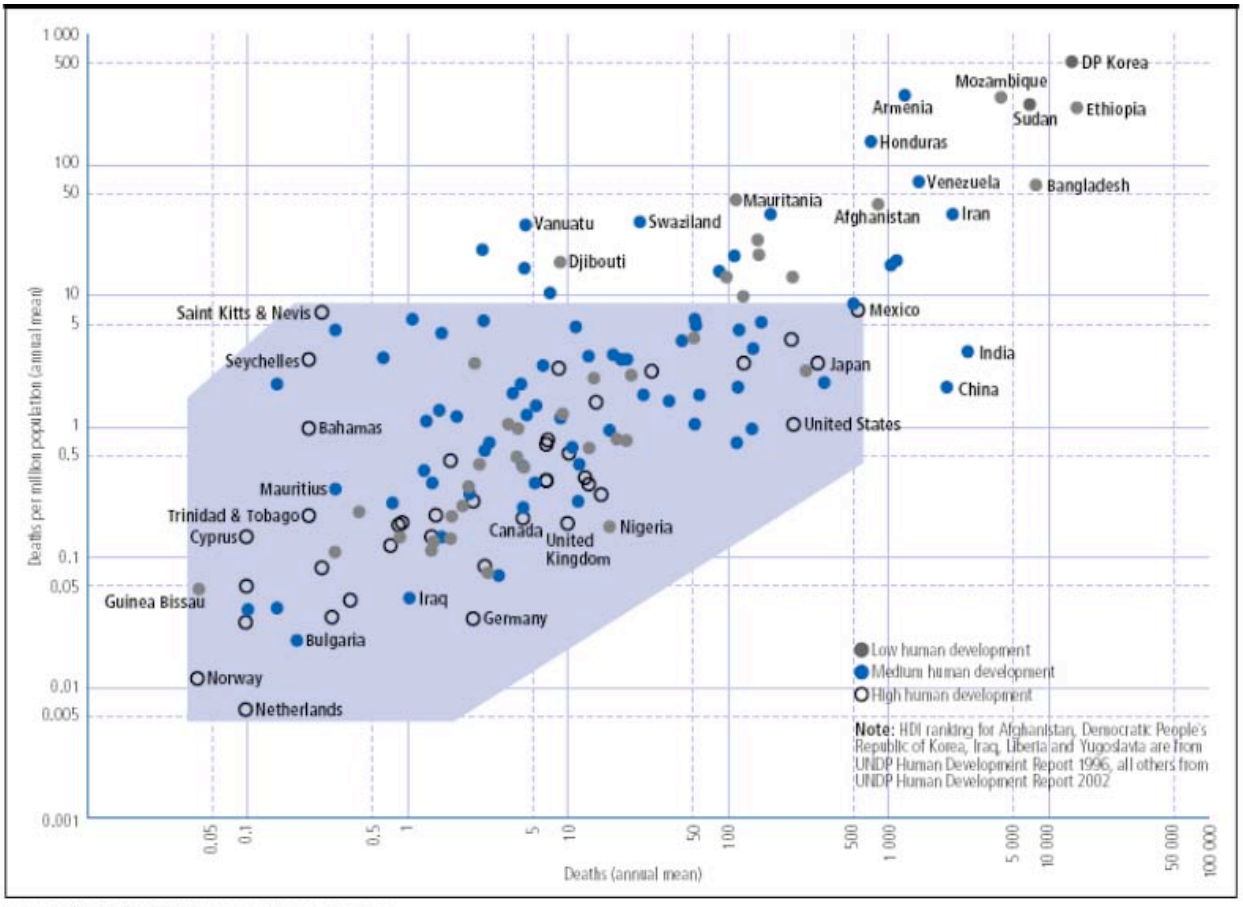
The ability to adapt to extreme weather events is lowest in the poorest segments of society and in countries where resources, information, and skills are limited; technology is often unavailable; institutions are unstable or weak; and empowerment and access to resources is inequitable (Smit et al. 2001).

Vulnerability (evidenced by numbers of people affected and death rates from natural disasters) is, not surprisingly, highest in emerging markets (Figures ES-4).

Among the many reasons for the vulnerability of emerging markets to natural disasters are population growth, urbanization, intensive coastal development, high geographical concentration of certain types of climate-sensitive physical and health-related hazards (e.g., tropical cyclones and infectious or water-borne diseases), susceptibility to damage because of the absence of building codes, and relatively heavy economic reliance on the particularly vulnerable agricultural sector.

The weather-related subset of disasters (excluding earthquakes, volcanoes, and disasters caused by people) corresponds to 98 percent of the people affected by disasters of all types.

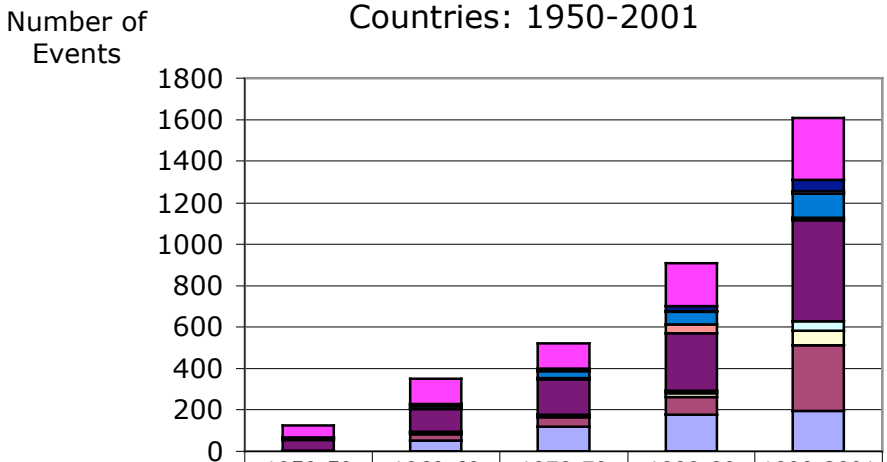
Figure ES-4. Vulnerability is Higher among Lower-Income Countries (Deaths from natural disasters)



Source: EM-DAT OFDA/CRED International Disaster Database From UNISDR (2003). Note that scales are logarithmic.

According to statistics in the Emergency Events Data base (EM-DAT), compiled by U.S. Agency for International Development Office of Foreign Disaster Assistance (USAID/OFDA) and the Center for the Research in the Epidemiology of Disasters (CRED), the number of weather-related natural disasters has risen sharply during the past 50 years (Figure ES-5).[4] The incidence of weather-related disasters per decade has risen from approximately 100 to 1,600 events during the past 50 years in less-developed countries, with the number of people impacted or killed per decade rising steadily from 15 million during the 1950s to four billion during the 1990s. These trends are a result of changes in the nature of natural hazards and demographic factors bringing greater numbers of people into harm's way.

Figure ES-5. The Frequency of Weather-Related Disasters Has Risen in Less-Developed Countries: 1950-2001



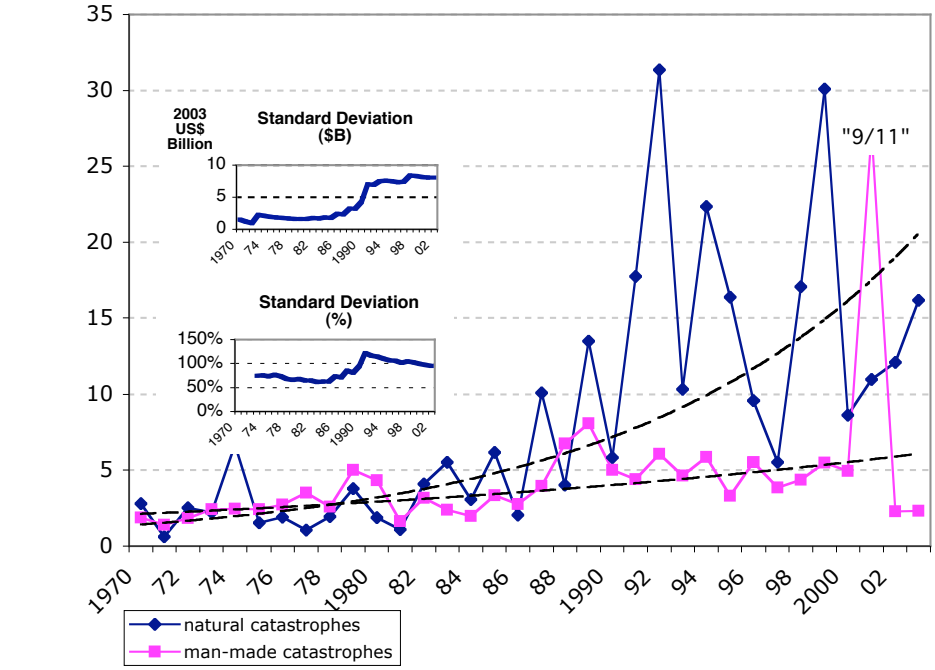
	1950-59	1960-69	1970-79	1980-89	1990-2001
Wind storm	59	121	121	207	300
Wild fire	0	4	11	25	54
Wave/surge	2	5	2	3	12
Slide	11	15	34	63	114
Insect infestation	0	1	6	43	13
Flood	50	110	170	276	489
Famine	0	2	4	11	45
Extreme temp	4	10	9	19	70

Sources: OFDA / Center for Research in the Epidemiology of Disasters (CRED) "Natural.xls" Intl database of Disasters (http://www.cred.be/emdat/intro.html) and U.S. Census Bureau's International Database (http://www.census.gov/ipc/www/idbagg.html). From analysis completed by Padco's Climate Change Solutions Group for USAID's Global Climate Change Team. "Population Impacted" includes those persons that have either been killed, injured, left homeless, or otherwise adversely affected.

[4] As with all such datasets, caveats apply with respect to uniformity over time in data collection methods, data quality, comprehensiveness, etc. A discussion of the EM-DAT data provided by Brooks and Adger (2003) concludes that analyses based on data from 1970 forward are "fairly robust."

Although all losses have increased in absolute terms, the rise in the relative incidence of weather-related events (such as wildfire, extreme temperature episodes, and epidemics) compared to non-weather-related ones (such as volcano eruptions or earthquakes) is particularly notable (Vellinga et al. 2001). The costs of so-called "man-made catastrophes" have also risen more slowly than those of natural catastrophes (Figure ES-6), as has variability.

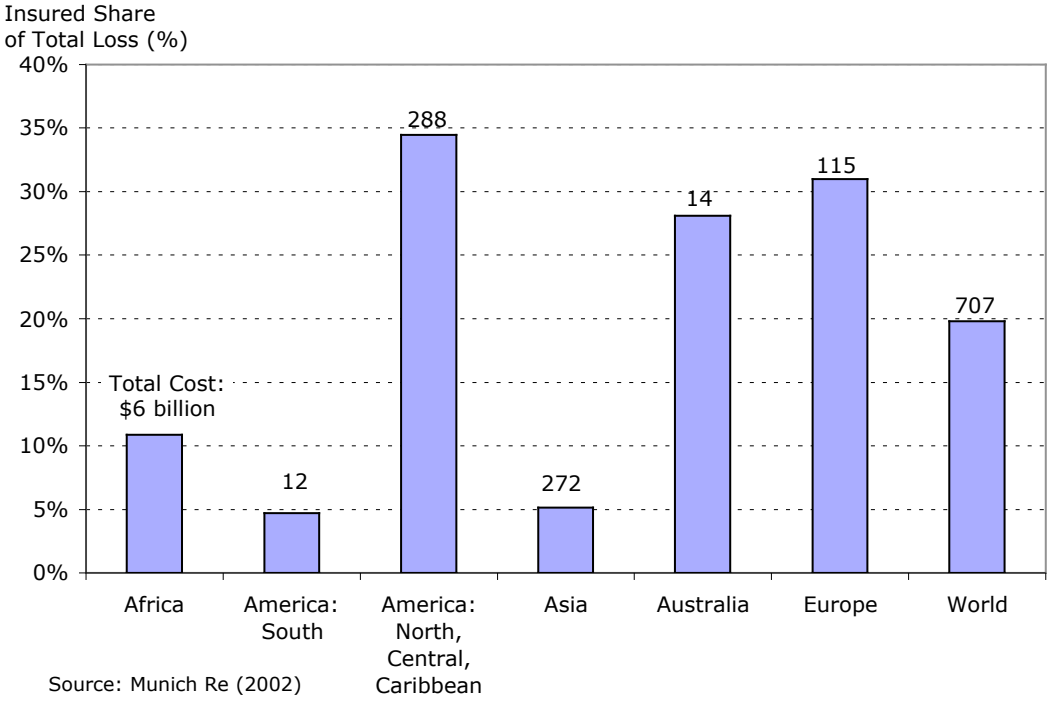
Figure ES-6. Global Inflation-corrected Insured Disaster Losses on The Rise: 1970-2003



Per Swiss Re's conventions, losses reported here are a subset of the total, including events with losses in excess of $35.1 million or total economic losses in excess of $70.2 million or 20 dead or missing, 50 injured, or 2000 homeless. Source: Swiss Re, Economic Research & Consulting, sigma 1/2004 [Swiss Re (2004)]. Excludes life/health insurance impacts. Growth rate of weather-related natural catastrophes is greater than that of non-weather-related ones, e.g. earthquake and volcano. Trendlines added.

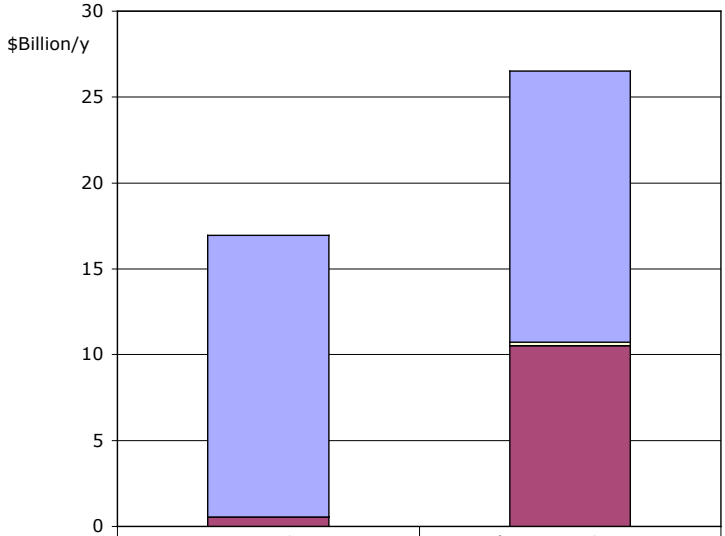
From 1980 through 2003, the economic costs of all weather-related natural disasters totaled $1 trillion, divided approximately 40/60 between wealthy and poor countries, respectively (Munich Re 2004). Over this period, insurance covered four percent of the total costs of weather-related disasters in low-income countries and 40 percent in high-income countries (Figures ES-7, ES-8). Associated insurance payments were three-times the amount of international aid provided. Social costs have increased more quickly than economic costs (death rates have increased fifteen-fold compared to a fivefold increase in economic costs) in the emerging markets. According to the Intergovernmental Panel on Climate Change (IPCC), costs are rising because of a combination of changes in the nature of natural disasters and the increasing vulnerability of society to these disasters (IPCC 2001). Costs not absorbed by domestic governments, foreign aid, or insurance fall on impacted citizens and businesses.

Figure ES-7. A Greater Share of Weather-Related Losses are Insured in Mature Markets than in Emerging Markets (1985-1999)



Source: Munich Re (2002)

Figure ES-8. A Small Proportion of Weather-Related Disaster Costs Are Absorbed by Insurers in Lower-Income Countries



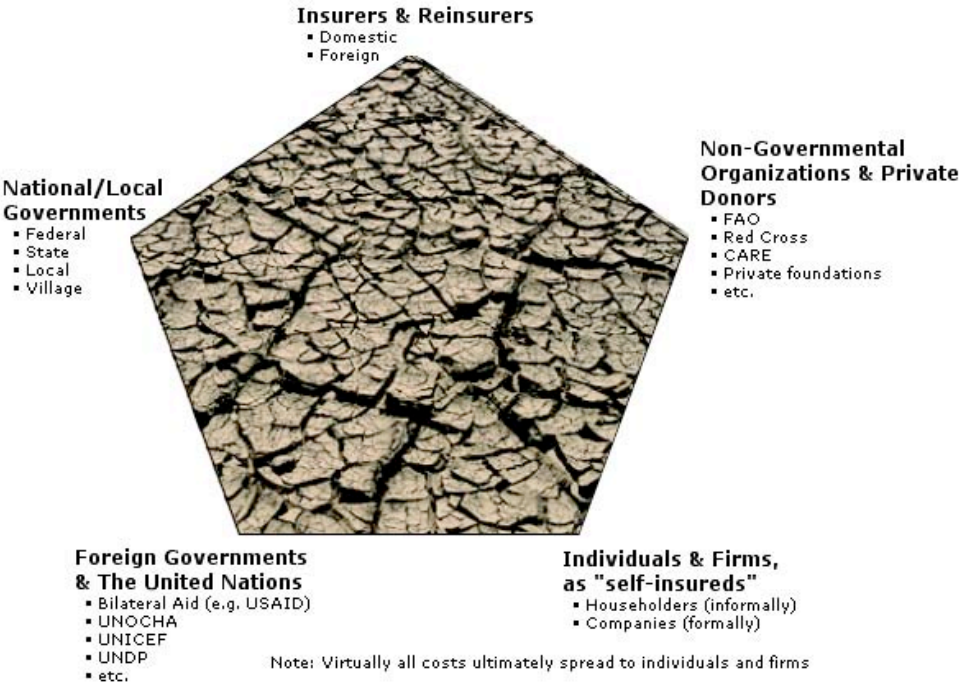
	Low Income Countries	High Income Countries
Domestic governments & Individuals	16.40	15.79
Internationnal Aid	0.00	0.20
Insurers & Reinsurers	0.55	10.53

Notes: Periods over which yearly averages are determined: Total: 1980-2003, Insurance: 1980-2003, AID: 1992-2003. Sources: http://www.reliefweb.org (disaster relief); Munich Re 2004 (insurance and total economic costs; low-income defined as property/casualty premiums of $100/capita-year or less). Value for domestic governments & individuals is the residual. Aid donors include those tabulated by OCHA: UN Agencies, donor governments, international organizations, the Red Cross, and NGOs (excludes purely military aid).

The Costs of Weather-Related Risks are Widely Spread Among Governments, Insurers, & Individuals.

Risks from natural disasters are spread among five distinct groups: insurers and reinsurers; domestic governments (local/national); individual foreign governments and cross-national bodies such as the United Nations (UN); non-governmental organizations (NGOs) and private donors; and the individuals and firms ultimately impacted when no form of assistance is available (Figure ES-9). International relief for natural disasters covers only a small fraction of the cost of these disasters, and, during the past two decades, overall aid, as defined by the United Nations Office for the Coordination of Human Affairs (UNOCHA),[5] has been roughly constant (and declining in terms of aid/donor gross domestic product) while the costs of weather-related disasters have tripled in real terms. Although, as noted above, more people are impacted by weather-related events than any other type of event that precipitates the mobilization of emergency relief, the majority (86%) of emergency relief funds are directed toward non-weather-related events, particularly the so-called "complex emergencies" such as civil conflict.

Figure ES-9. Extreme-Weather Risks Are Spread in Five Directions



Even in wealthy nations, governments are increasingly seeking to limit their financial exposures to natural disasters (e.g., the U.S. National Flood Insurance Program will pay out no more than $250,000 per loss per household (McDonald 2003)). The problem is worse in emerging markets where governments are hard pressed to absorb the large costs of natural disasters (which are unpaid by insurers, aid, or individuals). Disruption of economic activity and diversion of government funds to prepare for and recover from natural disasters constrains development.

Insurance is the only source of adaptive capacity that is clearly increasing.

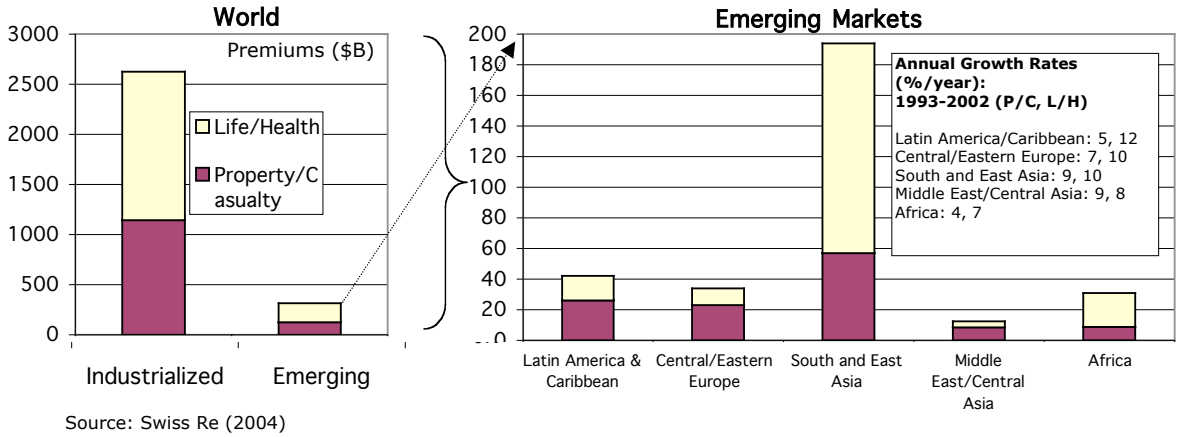
[5] Includes The Organization for Economic Cooperation and Development (OECD)/Development Assistance Committee (DAC), multilateral, and non-DAC sources. Excludes purely military aid. See http://www.oecd.org/dac/htm/online.htm.

The Global Insurance Market Offers Considerable Adaptive Capacity.

Worldwide, insurance companies collected $2.9 trillion in premiums in the year 2003 or about eight percent of global GDP.[6, 7] To put the size of the insurance industry in perspective: comparing the industry's revenues to national GDPs shows that it is equivalent to the third largest country in the world. The insurance sector perhaps is the world's largest industry.[8]

The distribution of annual insurance premiums paid among emerging markets is as follows: 62 percent of premiums originate from South and East Asia, 13 percent from Latin America and the Caribbean, 11 percent from Central/Eastern European, 10 percent from Africa, and four percent from the Middle East and Central Asia (Figure ES-10). The mix of life-health versus property-casualty insurance vary widely among nations, with a 40/60 ratio on average (Figure ES-10), but the magnitude and growth rates of life insurance tend to be greater than those of property insurance. In response to the confluence of economic growth, population growth, and market liberalization, the insurance sector is growing rapidly (significantly faster than GDP) in emerging markets (Figure ES-11). During the past two decades, premium growth in emerging markets has consistently exceeded, by a factor of two on average, premium growth in industrialized economies where insurance saturation is greater. [9] At current growth rates, emerging markets will represent half of world half of world insurance premiums by the middle of this century.

Figure ES-10. Global Insurance Market Summary: 2003



Source: Swiss Re (2004)

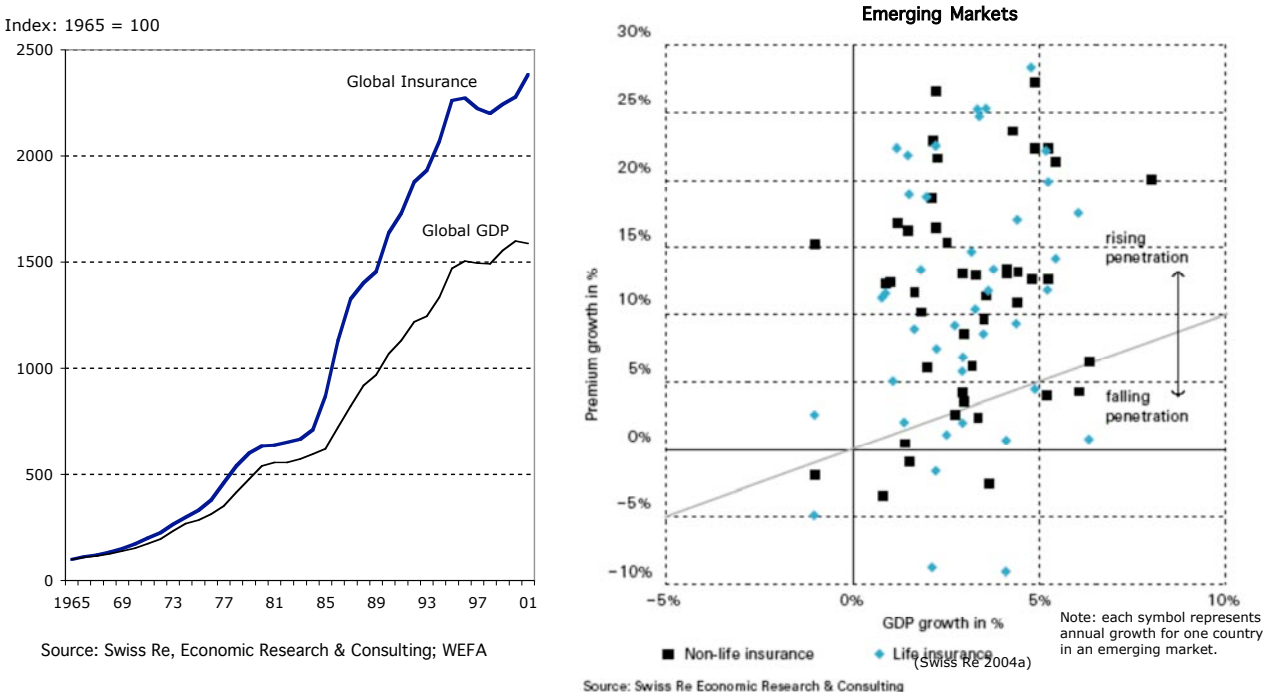
[6] Detailed country-by-country statistics (in U.S. dollars and local currencies) are published in Swiss Re's annual "World Insurance" reports (e.g., Swiss Re 2004a).

[7] Data presented in this report represent western-style insurance and do not include the premium-equivalents that are collected from alternative systems, such as *Takaful* methods used in the Muslim world or so-called "self-insurance" which is often formalized and represents considerable capacity.

[8] The world oil market, for example, is $970 billion/year at current production levels of 76Mbod and $35/bbl price; world electricity market in 1996 was $1.3 trillion at 13 trillion kWh generation assuming $0.10/kWh unit price; tourism receipts were $445 billion in 1998; world military expenditures were $800 billion in 1995 (Source: 1999 Statistical Abstracts of the United States).

[9] For the period 1980 to 1998, South and East Asia was the fastest growing region with 15 percent per year growth for non-life insurance and 25 percent for life insurance. In Latin America, growth was 10 percent and 15 percent,

Figure ES-11. Insurance Demand is Growing Faster than GDP, Particularly in Emerging Markets



Because of growing demand and affluence in developing countries and economies in transition, insurers from industrialized countries are rapidly moving into those markets. Insurance systems, however, are already challenged by natural disasters in wealthy countries where risk management and disaster preparedness are well developed. The outcome of this tug of war is key to determining the ultimate global role that insurers will seek to play in absorbing the costs of natural disasters.

Historical data on the degree to which insurance is used to pay for extreme weather events show that approximately 30 percent of costs are insured in industrialized economies while only five percent are insured in emerging markets (Vellinga et al. 2001). In both developing and industrialized countries, the penetration of insurance by type of event varies, with most coverage for storms and least coverage for flood[10] and "other" events such as drought and wildfire. Approximately 45 percent of global storm-related losses were insured over the 1985-1999 period versus five percent of flood and 13 percent of "other." Some events go uninsured; e.g., global losses from drought and heat wave reached nearly $7 billion in 2002, and little or none of these losses was insured (Best's Review 2003).

---

and in Africa five percent and 15 percent, respectively. Trends in Eastern Europe were highly erratic for the post-1992 period for which data are available (Swiss Re 1999a).

[10] There is a common misconception that floods are entirely uninsured. Typically one-quarter of flood losses are paid by insurance, depending on the country in which they occur and the nature of the impacts. More than half of the economic losses from the massive Central European floods in 2002 were insured (Best's Review 2004). Definitional ambiguities often class flood-related losses as (insured) "storm" losses (Swiss Re 2003c).

The argument has been made that insurance can play a substantial role in managing and spreading risks, both because of its financial capacity and its ability to encourage loss-reducing behaviors more effectively than public-sector efforts (World Bank 2002b). By pooling risks among all those insured, insurers reduce the potential exposure of any individual to a manageable level; this effective risk spreading helps ensure that funds are available to pay for losses.[11] In addition to pooling risks, insurers are often proactive risk managers, e.g., by endorsing (or requiring) loss-prevention behaviors or technologies. Examples include insurers' historical role in creating building codes, fire departments, and Underwriters Laboratories product-safety labeling (Mills et al. 2001). More recently, insurers have begun to promote practices that enhance sustainability, particularly in energy use and management (Mills 2003b). Examples include promoting distributed electricity generation to reduce risks of power disruptions and energy-efficiency strategies that reduce vulnerability to freeze damage and provide off-grid lighting or water purification (which are important in disaster recovery). By helping spread the risks and costs of damages and by fostering disaster resilience in the face of rising losses, the insurance industry can help build adaptive capacity in emerging markets.

The Consequences of Extreme Weather Events are Becoming Increasingly Globalized, in Part Because of the Structure of Insurance Markets.

As explained above, the costs of natural disasters in emerging markets are partly transferred to wealthier nations. This will be increasingly true in the future. Wealthier nations pay these costs because primary insurers are foreign-owned, locally domiciled insurance companies are reinsured (most reinsurers are based in industrialized countries), and international aid is provided in response to disasters.

Insurance is an integral part of the trend toward globalization, and U.S.-based insurers are leading the way, as measured by the magnitude of their participation in foreign markets. Current trends toward deregulation and liberalization in Asia and Eastern Europe as well as increasing wealth are fueling the growth of insurance.

Experience to date suggests that participation of foreign insurers will be important for the development of new insurance markets in developing countries and economies in transition. A statistical review by Swiss Re (2000b) found that growth of foreign insurers' premiums in emerging markets averaged more than 20 percent per year during the 1990s. During the late 1990s, the U.S. alone was collecting approximately $40 billion in premiums for policies placed overseas, with an average annual growth rate of 10 percent between 1990 and 1998 (III 2003). [12] Between 1990 and 2000, the market share of insurers that were either partly or fully foreign owned tripled in Latin America and Central and Eastern Europe[13] to 47 percent and 41 percent,

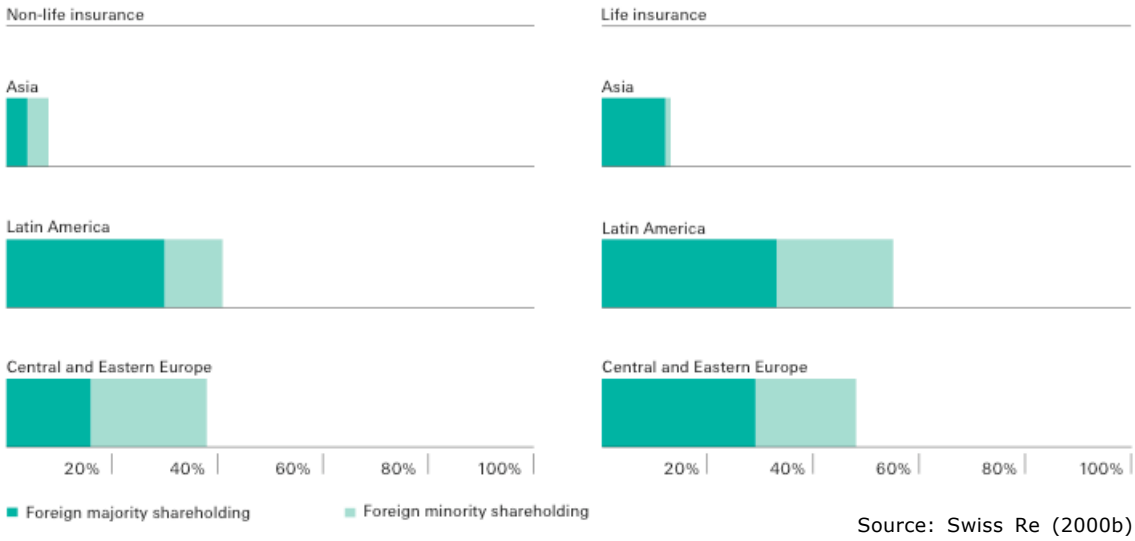
[11] Of course, insurers can become insolvent following catastrophic events although this is the exception to the rule, and solvency is less of an issue for insurers than for individually "self-insured" households or businesses.

[12] The leading insurers in this category include Aetna, AIG, CGU, Chubb, Cigna, Metropolitan Life, New York Life, and Prudential (Swiss Re 2000b).

[13] Data for additional Central and Eastern European countries are provided in Munich Re (2000b) and Swiss Re (2001b).

respectively, and to 12 percent in Asia (Figure ES-12) (Swiss Re 2000b).[14] Although they enjoy the considerable business potential of emerging markets, foreign insurers must also help pay the growing costs of extreme weather events, including the costs of flood, drought, wildfire, and the health impacts of these disasters.

Figure ES-12. Foreign Participation in Ownership is Important in the Insurance Market: 1998



Source: Swiss Re (2000b)

Insurers domiciled in industrialized countries are also vulnerable to extreme weather events in less-developed countries through insurance of property or activities associated with international trade or commerce. Types of coverage affected range from political risk insurance to marine insurance and coverage for other weather-sensitive energy-sector activities such as those associated with the oil trade (SAI 2000). Natural disasters can also have ramifications for distant economies by disrupting supply chains and other increasingly interconnected market systems. In addition, insurance observers note that much-discussed government caps on emissions could result in liabilities for polluting companies, which could, in turn, manifest in product liability, business interruption, or Directors and Officers insurance exposures (Aldred 2004a,b).

Reinsurance is another important element of global risk spreading. Reinsurance is the purchase of insurance *by* insurers, typically for losses in excess of a pre-agreed amount, and is the means by which many insured risks (both life and non-life) are ultimately distributed (Reitz 2003b). Because a given reinsurance company will assume risks from thousands of insurers around the globe, reinsurance is an inherently global segment of the industry. The world reinsurance market

[14] Chile and Mexico have the highest penetrations. In Asia, the greatest shares are found in Malaysia, the Philippines, Indonesia, and Singapore (Swiss Re 2000b). In Central and Eastern Europe, Hungary and Poland have the highest penetration of foreign insurers.

is projected to nearly double from $106 billion in premiums in1995 to $194 billion in 2010 (Duffy 2001).

Meanwhile, as noted earlier, international aid—a key pathway through which extreme-weather risks are becoming globalized—has not kept pace with the growth in demand for natural disaster relief. Importantly, international aid has been flat in the past two decades (at approximately $60 billion per year) and declining as a percentage of donors' GDP, while the inflation-corrected economic costs of natural disasters has increased eightfold. Moreover, most (if not all) aid goes toward recovery, and little is directed to proactive and preventive measures. In addition, foreign policy considerations mean that the majority of aid is designated for events other than natural disasters.

The Potential for New Patterns of Extreme Events Resulting from Climate Change will likely Increase Demand for Insurance while Challenging the Industry's Ability to Assume New Risks.

Over the past 30 years, insurers have seen property-casualty claims from natural disasters (corrected for inflation) rise considerably compared to other losses (Figure ES-6). (Corresponding life-health insurance loss trend data have not been published.) Coupled with the growing rate of losses, insurers expanding into emerging markets also encounter actuarial uncertainties posed by the increasing volatility of weather events associated with global climate changes as well as the greater exposures and vulnerabilities of emerging markets to these disasters.

Regardless of whether climate change is a result of human activities or natural variation in weather patterns, the observed increase in uncertainty regarding the intensity, frequency, and location of extreme weather events confounds the fundamental actuarial processes that underlie well-functioning insurance markets. Increased uncertainty can thus call into question the insurability of certain risks, which may limit the availability of insurance. Climate change is a significant concern for both the property-casualty and life-health segments of the industry, perhaps more so for the latter segment because of its relatively larger size and growth rate.

The view that climate change is a strategic business risk is more prevalent in the insurance industry than any other component of the financial services sector (UNEP and Innovest 2002). However, according to a group of 90 concerned insurance companies working under the auspices of the United Nations Environment Programme (UNEP), insurers and reinsurers have not yet broadly responded to calls to help emerging markets prepare for and respond to climate change. The UNEP insurers' group argues that proactive steps would be in the industry's financial interest and consistent with the industry's underlying principles of risk management.

Insurance for Extreme Weather Events can be Coupled with Strategies that Contribute to Sustainable Development and Enhance Disaster Resilience.

Public-private partnerships can enhance the efficacy of both insurance and increase the pool of people who have access to it. In a relatively straightforward example, commercial insurance

companies in the U.S. are introducing flood insurance to complement that provided by government programs (McDonald 2003). More innovative examples include systems for delivering insurance to the poor (e.g., micro-insurance or small-denomination/low-cost weather hedges) combined with technologies and practices that simultaneously reduce vulnerability to disaster-related insurance losses and support sustainable development and reductions of greenhouse gas emissions. A strategy combining these elements was piloted in the Caribbean where USAID/OFDA and NGOs provided trained homebuilders to construct hurricane-resistant housing, banks provided financing for construction, and insurers made coverage available where it had not previously been. Other relevant products include insurance for predicted energy savings (Mills 2003c) and coverage for carbon-trading contracts, which is being developed by major insurers, including Aon (Aon n/d). Insurers have stated their receptivity to arrangements like these, noting the new imperatives presented by climate change (Munich Re 2004).

Strategies that contribute to public health and sustainable development by cost-effectively mitigating damage from (and thus costs of) natural disasters include curtailing deforestation, which reduces risks such as wildfire, malaria, mudslides, and flooding while also reducing emissions of greenhouse gases. Other strategies involve an intriguing combination of adaptation and mitigation; e.g., methods of reducing the vulnerability of buildings and their occupants to urban heat-island effects and acute heat catastrophes also tend to increase energy efficiency, thus curtailing greenhouse gas emissions.

New initiatives with the insurance community can be part of a quilt of strategies involving a diversity of public and private stakeholders. Before considering which initiatives to undertake, specific intervention criteria should be developed to help prioritize efforts. Particular markets (economic, demographic, and geographic) should be identified to target first. The relevance of the proposed initiatives should also be clearly explained to insurers sought as partners. Insurers have many fires to fight in the regulatory and business arenas, and climate change is rarely perceived as the most important one, so public entities seeking partnerships with insurers must establish and demonstrate the value of these partnerships.

Based on the findings of this study, we offer the following principles to consider in establishing priorities and creating effective projects:

- ***Focus on Efforts that Enhance the Fundamental Insurability of Weather-Related Risks –*** A constructive starting point for enhancing market opportunities for insurance of natural disasters is to address conditions that cause insurers to perceive current risks as uninsurable. Sustainable development can create a more fertile environment for insurance (e.g., undertaking activities that reduce vulnerability to drought or disease), helping to prevent insurance availability from stagnating or receding.

- ***Couple Insurance Efforts with Core Development Activities –*** The development and relief communities increasingly agree that sustainable development efforts will fail if not coupled with broader development objectives (increased economic growth, healthcare, quality of life, etc.). Encouraging a culture of risk management is one example. Insurers will place more value

on sustainability-driven initiatives that enhance disaster resilience if there is a corresponding risk reduction that makes markets more attractive to do business in. Environmental initiatives and insurance can be coupled to increase the availability of financing for economic development.

- ***Foster Efficient Domestic Government and Private Insurance Risk Sharing –*** Certain risks may not be insurable without risk sharing with public-sector entities (e.g., investment in disaster preparedness or disaster-recovery funds). Effective combinations of government/private insurance are essential; for example, government "backstop" reinsurance of risks can enable private insurers to assume the initial "layer" of losses (as has been observed in the case of terrorism insurance following the events of September 11, 2001).

- ***Utilize Public-Private Partnerships –*** As a corollary of the preceding point, sharing the cost of investment to reduce risk between the public and private sectors will be essential to successfully engage insurers in reducing vulnerability and increasing adaptive capacity to extreme weather events now and in the future (Kunreuther 2000). Governments can contribute to making risks insurable, e.g., by establishing land-use planning requirements and funding infrastructure or forest-management practices to reduce flood or wildfire risks. Insurers have called for this in the case of flood insurance, stipulating that government's role is to reduce the hazard such that commercial insurance is viable. Another example is in the handling of soil subsidence risks in Texas and other states resulting, in part, from groundwater depletion. In this instance, groundwater-removal permits are reviewed with respect to their potential impact on subsidence; government in turn provides a reinsurance mechanism and requires insurers to offer primary coverage (Cole et al. 2004).

- ***Build Domestic Insurance and Risk-Management Capacity –*** In some settings, insurance does not exist (i.e., is not available to certain populations), so the goal is to enable its introduction. Government initiatives can help create a fiscal and regulatory environment conducive to the entry of insurers. This has been seen in the dramatic growth of insurance in China and India, and, more recently, Central and Eastern Europe, as liberalization has enabled private market-oriented insurers to replace government-financed insurance systems and allowed for the entry of foreign insurers.

- ***Discourage Complacency in Response to Insurance Availability or Government Aid –*** Many observers have noted that efforts to manage risk can inadvertently encourage complacency or increased risk taking. This phenomenon is well known in relation to flood insurance where analysts have found that more people build homes in at-risk areas if insurance is available to cover their losses (Heinz Center 2000). The traditional way of dealing with this is to utilize deductibles or other mechanisms that require the insured to pay for a higher portion of their losses. Government-provided aid is seen to foster complacency and impede the ability of insurers to assume flood risks in the U.S. and Europe (Hodge and Zolkos 2003).
- ***Respond to Insurers' Regional Priorities –*** Insurers, especially those likely to partner with public-sector entities, have considerable experience with risk management, possess key data, and are the ultimate judges of which projects will make a material difference in reducing losses

and increasing the insurability of risks. Figure ES-3 illustrates how insurance penetration and losses from natural disasters vary by region. Insurers will assign greatest importance to markets in which the potential for insurance is large, demand is growing rapidly, and weather-related disaster exposures and vulnerability are high. As an illustration, insurance premiums in Africa have reached $30 billion per year and are growing at approximately four percent per annum, and there is a distinct concentration of impacts from flood, drought, famine, and epidemics. Those seeking to partner with insurers should identify and cultivate activities in the intersection of that industry's priorities and their own.

- ***Address Life and Health Issues as Well as Those Related to Property Damage –*** The majority of information available on climate-change issues in the insurance industry focuses on the property-casualty side of the business. (Most of the loss data in this report exclude health impacts because data are not systematically tabulated by insurers, and this class of insurable events tend to occur in diffuse patterns rather than in single large and easily documented catastrophic events). However, life insurance markets are growing more quickly than property-casualty markets, and the vulnerabilities and adaptation issues facing life and health insurers are quite different than those facing property insurers (Campbell-Lendrum et al. 2003). Issues range from incremental and diffuse impacts such as the erosion of water quality and availability to abrupt impacts such as disease epidemics or heat catastrophes, as well as the mental and cognitive health consequences of the consequences for physical health. The severity and/or ranges of at least 18 diseases are linked with climate factors (WHO 2004). One public-private effort to study these issues is a health-scenarios project that has been initiated by Swiss Re and UNDP, with the work being performed by the Harvard Medical School. The project is examining the insurance implications of drought, flooding, heat waves, malaria, Nipah Virus, West Nile Virus, pollen and molds, agricultural pests and pathogens, coral and bivalve disease, wildlife diseases, and forest pests.

- ***Raise Awareness within the Insurance Community –*** In the press of day-to-day business, many insurers have not made the time to focus on the kinds of issues discussed here. In their most significant and recent study on the issue, the UNEP Insurance Industry Initiative's top recommendation for financial services companies and governments is that greater efforts be made to increase awareness within the financial services sector of extreme-weather and climate risks and associated issues (UNEP and Innovest 2002).[15]

- ***Harness Market-Pull Forces*** – As with other forms of market transformation, changes on the demand-side for insurance products can be as significant as proactive initiatives from insurance companies. Insurance brokers are important intermediaries who can work with consumer groups to aggregate demand for new insurance products and services. The use of micro-finance and micro-insurance is one example.

- ***Understand Insurers' Relationship to the Security Implications of Climate Change*** – The linkages among environmental degradation, natural disasters, and security are increasingly

[15] The UNEP/III is an insurance-industry-led group of approximately 90 insurance companies from 26 countries, convened under the auspices of UNEP.

being recognized (Schwartz and Randall 2003). A key trigger is the potential reduction in carrying capacity as a result of abrupt or incremental changes in climate and weather. Insurers bear the risks of these exposures in many forms, including: political-risk insurance claims, which can be triggered by social disruptions arising from natural disasters and by international conflict over the control of water, energy, and other resources likely be effected by climate change.